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Some Mountain Pine Beetle Infestation Characteristics in Dwarf Mistletoe-Infected and Uninfected Ponderosa Pine

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There were no significant differences in attacks or brood production between heavily infected and uninfected trees. Total egg gallery length per unit of bark area was greater in uninfected trees.

Keywords: *Dendroctonus ponderosae*, *Pinus ponderosa*, *Arceuthobium vaginatum* subsp. *cryptopodum*

Ponderosa pines (*Pinus ponderosa* Laws.) that are heavily infected with dwarf mistletoe (*Arceuthobium vaginatum* subsp. *cryptopodum* (Engelm.) Hawksworth and Wiens) grow at a slower rate than uninfected trees (Hawksworth 1977.) In lodgepole pine (*Pinus contorta* Dougl.), heavy mistletoe infection results in thinner phloem and reduced mountain pine beetle (*Dendroctonus ponderosae* Hopkins) brood production (Amman 1972, Roe and Amman 1970, McGregor 1978). Similar brood reduction might be expected in ponderosa pine.

This note examines mountain pine beetle brood and beetle attack densities, and total egg gallery length per unit area in ponderosa pine, shortly before beetle emergence. These infestation characteristics from trees with heavy dwarf mistletoe infection are compared to those in trees free of mistletoe.

Methods

Mountain pine beetle attacks, egg gallery length, and brood were counted from sample trees with dwarf

mistletoe ratings of either 5 or 6 on the 6-class scale (Hawksworth 1977). A bark sample, 15 by 30 cm, was taken at breast height from both the north and south sides of each of 100 trees. Similar samples were taken from 100 trees uninfected by mistletoe and situated as close as possible to the sampled infected trees. An effort was made to sample trees of similar diameters.

The bark samples were taken from trees widely distributed throughout the central portion of the Roosevelt National Forest in north-central Colorado. Data were collected during June 1978 and were subjected to analysis by "t" tests.

Results

Mountain pine beetle broods and attack density were not statistically different between heavily infected and uninfected trees. Total length of egg galleries per unit of bark area was approximately 10% greater in uninfected trees (table 1).

The brood densities obtained from trees with and without mistletoe were associated with declining beetle infestations.

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Table 1.—Comparison of mountain pine beetle (MPB) infestation characteristics in 100 pines heavily infected by dwarf mistletoe with 100 uninfected ponderosa pines, Roosevelt National Forest, 1978

Characteristics	Infected means	Uninfected means	Statistical significance
d.b.h. (cm)	29.8	30.8	NS
MPB per 9 dm ²	17.1	19.0	NS
Attacks per 9 dm ²	6.9	7.4	NS
Egg gallery length (cm) per 9 dm ²	247.1	270.1	P ^a 0.03

Agents causing beetle outbreak decline could conceivably mask initial brood differences if they do exist. This point is academic. However, broods should be investigated during early outbreak development to determine if mistletoe has an effect, not only on tree growth, but also on beetle broods.

There was no correlation between brood density and d.b.h., which is consistent with our previous brood sampling experience.

Mean beetle density of 23.9 per 9 dm² on the north side of trees was significantly greater than 12.2 per 9 dm² on the south sides ($P < 0.01$). Blackman (1931) observed similar north-south brood differences in ponderosa pine on the Kaibab Plateau, Arizona, as did Beal and DeLeon² in southern Wyoming. Reid (1963) reported similar relationships in lodgepole pine.

Beetle attack density was similar on both sides of the trees.

² Unpublished progress report of a study of the Black Hills beetle in southeastern Wyoming and central Colorado, summer of 1937. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo. 1938.

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